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Recent Developments on Perchlorate Groundwater Pollution within the Los Angeles Region

Information Item No. 15
for January 30, 2003 Public Meeting

California Regional Water Quality Control Board-
Los Angeles Region

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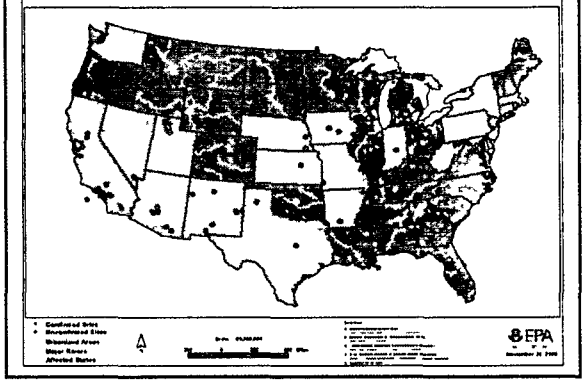
WHAT IS PERCHLORATE?

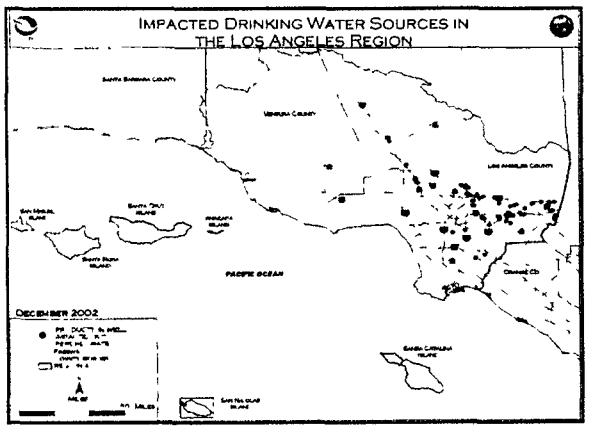
- Perchlorate is very soluble in water and therefore, very mobile in aquifer systems, similar to Sodium Chloride (table salt).
- It is used as an oxygen-adding component in solid propellant fuels for rockets, fireworks, missiles, explosives, munitions, military counter measures, pyrotechnics, highway safety flares, matches automobile airbags, in electroplating and Chilean fertilizer.
- Perchlorate occurs naturally, but is principally produced commercially by industry as a strong oxidizer.
- Found in groundwater as a contaminant. It is generally used as a strong oxidizer in many industrial applications.
- Improvements in laboratory testing in 1997 lead to a directive from USEPA and the Regional Board to have groundwater monitoring wells tested for the presence of perchlorate, starting with dischargers in the Baldwin Park Operable Unit.

REGULATORY ISSUES

- Perchlorate interferes with iodine uptake by the thyroid gland.
- No state or federal MCL for perchlorate
- The USEPA reference dose for perchlorate is 1 ppb
- California Action Level for perchlorate is 4ppb.
- OEHHA released in December 2002, a draft public health goal (PHG) that ranges from 2 to 6 ppb.
- The SDHS is required to adopt a Maximum Contaminant level for perchlorate by January 1, 2004.

U.S. Perchlorate Releases





PERCHLORATE DETECTIONS

- As of mid-December 2002, according to DHS (Dec. 2002), perchlorate has been detected in 150 surface water and production wells, in concentrations ranging from 4 to 159 ppb,
- Perchlorate groundwater pollution is widespread in the San Gabriel Valley of Los Angeles County, but to a lesser extent in Ventura County.

PERCHLORATE IMPACTS

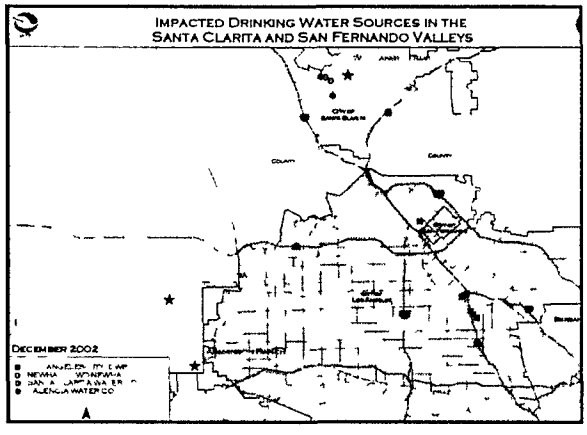
- Ventura County
  - » Perchlorate detected in spring water at the U S Naval facility on San Nicholas Island, Boeing's Santa Susana Field Laboratory, monitoring wells in Simi Valley, and potentially at Ahmanson Ranch

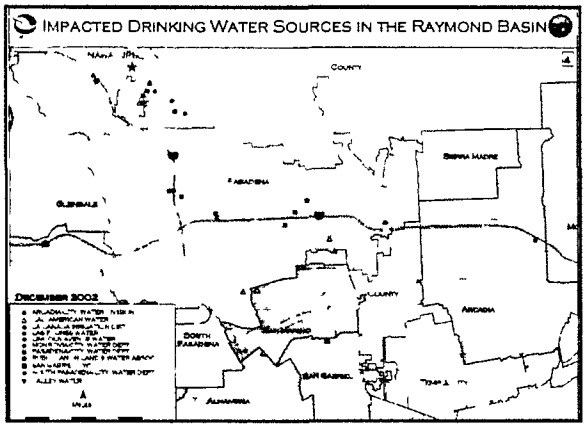
PERCHLORATE IMPACTS

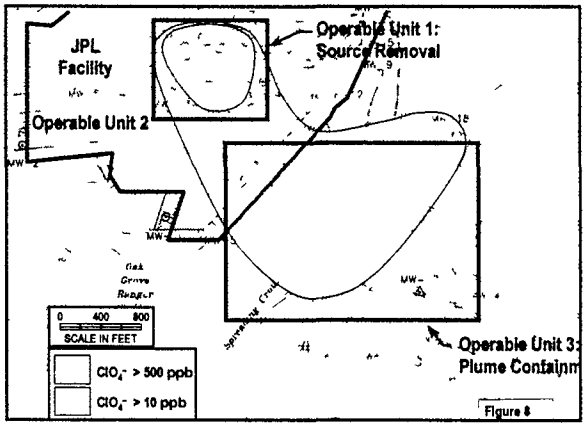
- Los Angeles County
  - » The cities of Santa Clarita, Valencia Saugus and Newhall have been affected
  - » Raymond Groundwater Basin-City of Pasadena shut down 9 of their 13 drinking water wells due to perchlorate impact, the probable source is NASA/JPL.
  - » In Central Basin sporadic detections in Vernon, Commerce, Norwalk and Bellflower have been reported
  - » In San Gabriel Basin, perchlorate has been detected basin-wide, inside and outside the Superfund areas
  - » In Pomona Valley the City of Pomona has reported perchlorate detections as high as 19 ppb in 23 production wells.

KNOWN PERCHLORATE SOURCE SITES

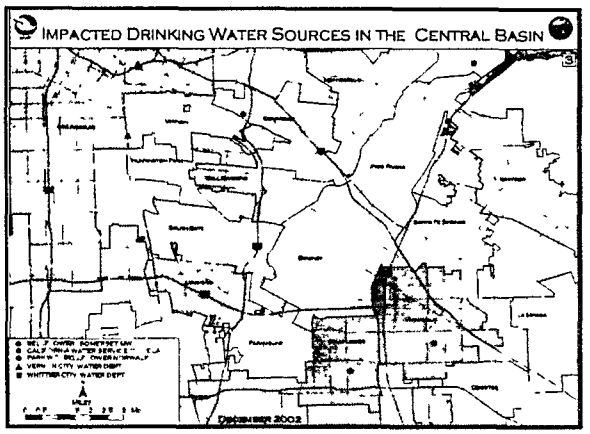
- Ventura County
  - » Boeing's Santa Susana Field Lab (near Simi Valley)
  - » U.S. Naval facility on San Nicholas Island
- Los Angeles County
  - » NASA/JPL (Pasadena)
  - » Aerojet (Azusa, and South El Monte)
  - » Wittaker Bermite Site (Santa Clarita)

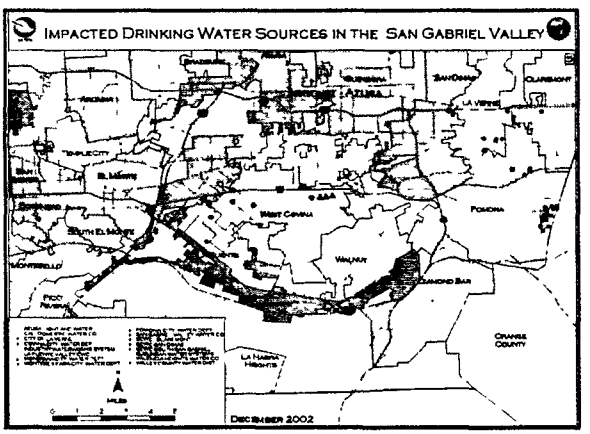


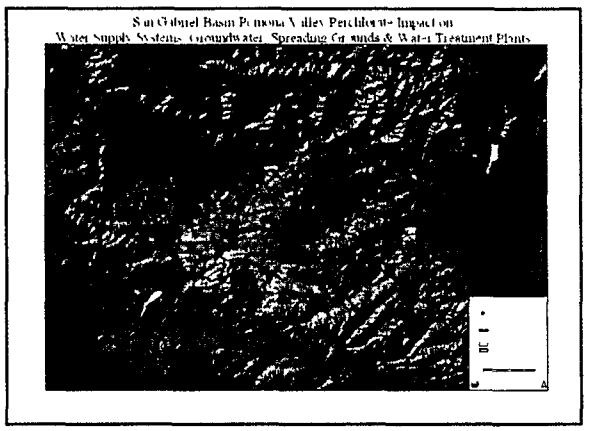


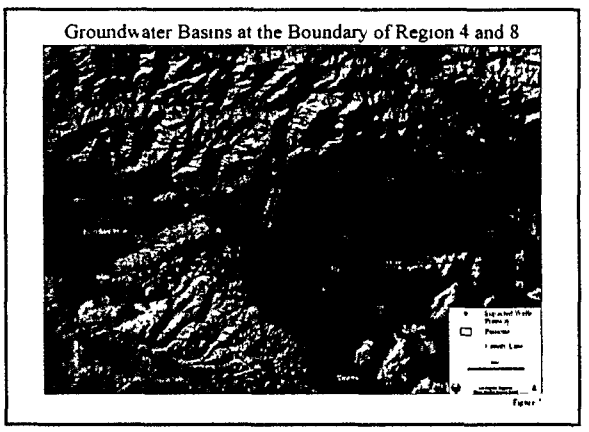


Above 500 ppb at JPL









ECONOMIC IMPACT

- The economic impact of perchlorate in groundwater is significant because conventional water treatment systems are unable to remove perchlorate.
- Drinking Water Treatment Plants designed to treat for VOCs, will not remove perchlorate
- This fact compounds the problem in Superfund areas where plants need to be redesigned to treat for perchlorate and other emergent compounds, such as 1, 4-Dioxane and N-nitrosodimethylamine (NDMA).
- Loss of direct beneficial use of groundwater resources.

REMEDIATION ECONOMICS

- Effective removal is achieved using ion exchange separations technology.
- Ion exchange removal of perchlorate down to the California Action Level of 4 ppb (O & M) costs is $125/acre-feet as opposed to $50 /acre-feet for VOCs.
- This compares to $460 per acre- feet to import portable water.
- The ion exchange process yields a brine by-product which requires expensive disposal.
- Increased cost for replacement water.

ACCOMPLISHMENTS

Source Identification Efforts

1997- Regional Board staff directed the City of El Monte, water supply companies and some dischargers to sample for perchlorate. The analytical results ranged from 1 to 5 ppb

1998 - Assisted USEPA with the identification of perchlorate contaminant sources in the Azusa/Baldwin Park Area.

1998 - Assisted USEPA with the revision of the 1984 Record of Decision for the Baldwin Park Operable Unit amended to include perchlorate.

1999 - Directed PRPs in El Monte Operable Unit to sample for perchlorate.

2000 - Directed Lockheed (in San Fernando Basin) and NASA/JPL (Raymond Basin) to sample for perchlorate.

2001 - Directed some dischargers in Monrovia and South El Monte to sample for perchlorate.

2002 - USEPA and the Regional Board direct PRPs in South El Monte and Puente Valley Operable Units to sample for perchlorate and other emergent chemicals

2003 - Regional Board staff sent out 433 letters to WDR dischargers requesting a one time sampling for perchlorate, NDMA, 1 4-dioxane and hexavalent chromium.

CONCLUSIONS

- The sources of perchlorate groundwater pollution are largely unknown. Most of those identified source sites have not been remediated. Coupled with existing VOCs contamination, the presence of emergent chemicals makes the problem more acute.

- The widespread occurrence of perchlorate in groundwater poses a significant economic burden to drinking water resources in the *Los Angeles Region*.